

THE GENUS CASTELIA

Harold N. Moldenke

This is the eighteenth in my series of monographic treatments of the genera of Verbenaceae. Previously published treatments have been of the genera Aegiphila Jacq., Amasonia L. f., Baillonia Bocq., Bouchea Cham., Casselia Nees & Mart. [Timotocia Moldenke], Chascamm E. Mey., Cornutia Plum., Petitia Jacq., Petrea Houst., Priva Adans., Recordia Moldenke, Rehdera Moldenke, Rhaphithammus Miers, Svensonia Moldenke, Tectona L. f., and Vitex Tourn., and the New World and cultivated representatives of Callicarpa L.

A full explanation of the abbreviations employed for the names of herbaria in this series of papers will be found in Phytologia 5: 154--159 (1955).

CASTELIA Cav., Anal. Cienc. Nat. Madrid 3: 134, pl. 30, Icon. & Descr. 6: 60, pl. 583. 1801 [not Castelia Liebm., 1853, nor Castela Turp., 1806, nor Castellia Tin., 1817].

Synonymy: Cartelia Cav. apud C. Gay, Hist. Fis. Chile Bot. 5: 7, sphalm., in syn. 1849. Pitiraea Turcz., Bull. Soc. Imp. Nat. Mosc. 35 (2): 328--329. 1862. Phelloderma Miers, Trans. Linn. Soc. Lond. Bot. 27: 100. 1870. Priva Juss. ex Miers, Trans. Linn. Soc. Lond. Bot. 27: 100, in syn. 1870 [not Priva Adans., 1763]. Bouchea Gay ex Miers, Trans. Linn. Soc. Lond. Bot. 27: 100, in syn. 1870 [not Bouchea Cham., 1832].

Literature: Cav., Anal. Cienc. Nat. Madrid 3: 134--135, pl. 30. 1801; Cav., Icon. & Descr. 6: 60--61, pl. 583. 1801; A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 70. 1806; Pers., Syn. Pl. 2: 139. 1807; Hook., Bot. Misc. 1: 172. 1829; R. Graham, Edinb. N. Phil. Journ. 29: 174. 1840; Walp., Repert. 4: 36. 1846; Schau. in A. DC., Prodr. 11: 533 & 556. 1847; C. Gay, Hist. Fis. Chile Bot. 5: 7 & 26--27 and Atlas 1: pl. 55. 1849; Bocq. in Baill., Adansonia 3: 236. 1863; Turcz., Bull. Soc. Imp. Nat. Mosc. 35 (2): 328--329. 1862; R. A. Phil., Anal. Univ. Chil. 35: 193. 1870; Miers, Trans. Linn. Soc. Lond. Bot. 27: 100--102 & 109, pl. 27. 1870; Lorentz, Veg. Nordeste Prov. Entre Rios 150. 1878; Griseb., Symb. Fl. Argent. 275. 1879; F. Philippi, Cat. Pl. Vasc. Chil. 217. 1881; Gartenfl. 32: pl. 1131. 1883; Jacks., Ind. Kew. 2: 493. 1894; Rusby, Bull. Torrey Bot. Club 27: 80. 1900; Reiche, Fl. Chil. 5: 304--305. 1910; Hicken, Chloris Plat. Argent. 199. 1910; Anal. Soc. Cient. Argent. 88: 95--134. 1919; Sanzin, An. Soc. Cient. Argent. Buenos Aires 88: 106. 1919; Grenz., Ann. Mo. Bot. Gard. 13: 74 & 88. 1926; Kobuski, Ann. Mo. Bot. Gard. 13: 6, 16--17, pl. 4, fig. 12, & pl. 5, fig. 21. 1926; Seckt, Rev. Univ. Nac. Cordoba 17: 87 & 90. 1930; Junell, Symb. Bot. Upsal. 4: 39--43, figs. 73, 74, & 77--79. 1934; Dahlgren, Svensk. Bot. Tidsk. 32: 231. 1938; Moldenke, Alph. List Common Names 10 & 24. 1939;

Moldenke, Geogr. Distrib. Avicenn. 1, 25, 28, 29, & 36. 1939; Moldenke, Prelim. Alph. List Invalid Names 7, 35, 36, & 38. 1940; Moldenke, Lilloa 6: 314--316. 1941; Moldenke, Suppl. List Invalid Names 2. 1941; Moldenke, Alph. List Invalid Names 6, 12, 36, & 39. 1942; Moldenke, Lilloa 8: 414. 1942; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 1], 34, 36, 40, 42, 71, & 87. 1942; Bol. Mus. Hist. Nat. Jav. Prado 7: 244. 1943; Moldenke, Phytologia 2: 95. 1944; Moldenke, Lilloa 10: 339--340 & 369. 1944; Moldenke, Bot. Gaz. 102: 162. 1944; Moldenke, Holmbergia 4: 149. 1945; Moldenke, Alph. List Cit. 1: 16, 28, 30, 39, 59, 76, 83, 95--97, 104, 105, 112, 114, 117, 118, 136, 147, 201, 217, 235, 266, 274, 275, 313, 321, & 326. 1946; Lorentz, Veg. Nordeste Prov. Entre Ríos, repr. ed., 150. 1947; Moldenke, Alph. List Invalid Names Suppl. 1: 2 & 19. 1947; H. N. & A. L. Moldenke, Pl. Life 2: 31, 53, & 76. 1948; Moldenke, Alph. List Cit. 2: 338, 358, 371, 372, 373, 377, 379, 381, 407, 423--426, 430, 434, 435, 438--442, 500, 537, 561, 564--567, 575, 580, 593, 598--600, 613, 617, 626--628 (1948), 3: 662, 663, 672, 673, 703, 728, 731, 732, 735--737, 746, 767, 784, 812, 838, 843, 848, 859, 864, 865, 868, 880, 884, 893, 903, 911, 913, 931, & 940 (1949), and 4: 979, 980, 983, 1010, 1013, 1036, 1043, 1044, 1049, 1050, 1056, 1062, 1070, 1075, 1078, 1088, 1090, 1091, 1115, 1120, 1138, 1192, & 1302. 1949; Moldenke, Known Geogr. Distrib. Verbenac., [ed. 2], 71, 75, 96, 100, 103, 157, & 178. 1949; Ragonese, Revist. Investig. Agric. 6: 81. 1951; Moldenke, Phytologia 4: 451. 1953.

Perennial herbs, mostly of very arid areas, mostly 30--50 cm. tall, mostly glabrous below and minutely puberulent above, erect, often branched at or near the base, often stoloniferous; roots fibrous, producing fusiform tubers deep in the soil; branches decussate-opposite, tetragonal; leaves decussate-opposite, petiolate, mostly ovate or obovate, cuneately narrowed into the petiole at the base, obtuse at the apex, coarsely crenate or dentate along the margins, the teeth apiculate; inflorescence terminal, spicate, simple, many-flowered; flowers sessile or short-pedicellate, the upper ones mostly verticillate, the lower ones often scattered-solitary, all bracteolate; calyx cylindrical-tubular, 5-striate or 5-costate, the rim 5-fid, the teeth unequal, linear-acuminate or acute, erect, the posterior one shorter; corolla hypocrateriform, zygomorphic, varying from white to various shades of pink, mauve, lilac, or purple, the tube cylindrical or infundibular, about 1 1/2 times the length of the calyx, curvate or oblique, truncate at the apex, plicate within, the veins straight, expanded at the mouth into an oblong-anular oblique limb, the limb bilabiate or subbilabiate, the upper lip 2-lobed, the lower lip much larger and 3-lobed, the lobes unequal, ovate, rounded, the 2 posterior ones shorter and more erect, the anterior one longer and broader, the 2 intermediate ones subreflexed, somewhat smaller, and undulate-margined; fertile stamens 4, didynamous, the 2 upper ones anterior and inserted below the mouth of the corolla-tube, the 2 lower ones posterior and inserted at the middle of the corolla-tube, the fifth represented by a sterile staminode; filaments long or short, slender, pilosulous,

somewhat longer than the anthers; anthers oblong, 2-lobed, cordate or sagittate to the middle, equaling or scarcely surpassing the corolla-tube, laterally compressed, 2-celled, attached by a slender connective at the simuses, dehiscent by means of a longitudinal slit on both sides, introrse; pollen-grains globose, reticulate; staminode 1, anantherous, shorter and inserted somewhat lower than the stamens; style filiform, equaling the corolla-tube, gradually dilated and compressed at the apex; stigma rather large, abruptly uncinately-recurved, mucronate, bilamellately compressed, papillose on the inner surface; ovary subcylindric or conic-oblong, situated on a glandular disk, 2--4-celled, with a dissepiment directed toward the axis of the inflorescence and 2-lamellate, the lamellae distinctly separated; ovules usually 4, erect; fruiting-calyx distended, including the fruit, terminated by contorted-plicate teeth; fruit drupaceous, included by the mature fruiting-calyx, ovate, apiculate, smooth, scarcely striate, indehiscent, 2-celled, the cells covered by a dorsal thick and somewhat corky mesocarp, surrounded along the margins, at the cuneate-acuminate apex, and at the hollow base by a thick pith; nutlets (pyrenes) 2, immersed in and about half as long as the cells, ovate, plano-convex, deeply 9-sulcate on the outside, with the channels filled by mesocarp, 2-sulcate within, osseous, each 2-locular, the locelli perforated at the base by nutritive vessels; columella central, thin-membranous, empty, adnate, forming the vessel leading to the seeds; seeds solitary in each locellus, oblong, subterete, erect, attached at the extero-basal angle by a short funiculus; integument very thin; raphe lateral, ascending to the apical chalaza; embryo included in a sparse albumen, linear-cylindric; cotyledons 2, twice as long as the inferior radicle.

A monotypic genus native to Peru, Bolivia, Argentina, and Chile; cultivated and introduced elsewhere. It is named in honor of Juan de Dios Castel, Spanish companion of Loeffling on his trip of exploration up the Río Orinoco and concerning whom not much is known. *Pitraea* was named in honor of Adolf Samoilovic Pitra (1830--1889), Russian professor of botany at the University of Kharkov, noted for his work in plant physiology. It was based on *P. chilensis* Turcz., and was said by Turczaninow to resemble the genera *Mimulus* L. and *Diplacus* Nutt. in the *Scrophulariaceae*, which is true in a general superficial way. The genus *Phelloderma* was based on *Priva laevis* A. L. Juss., and the name is derived from , cork, and , skin, from the suberous covering in which the nutlets are embedded. The original publication of *Pitraea* is often given erroneously as "36 (2)", and that of *Phelloderma* as "27 (2). 1871."

It has been pointed out by Miers and others that this genus differs from *Priva* in the following respects: (1) the calyx does not become globosely expanded in fruit, (2) the corolla-tube has straight, not twisted, veins, (3) the corolla-limb is usually distinctly bilabiate, (4) the anthers are cordate or sagittate to the middle, (5) there is a fifth stamen represented

by a sterile staminode, (6) the stigma is simple and uncinatate, (7) the fruit is drupaceous, oval, apiculate, and smooth, (8) the nutlets ("nucules") do not separate spontaneously at maturity because of the somewhat suberose mesocarp which firmly holds them together, (9) the nutlets are borne in an "antical and postical" position, (10) there is a copious pithy ring surrounding the nutlets, (11) the nutlets are osseous, not testaceous, deeply furrowed on the back, not spinose, and (12) the seeds have a distinct, although thin, albumen. It differs from Bouchea (1) in having the longer tooth of the calyx posterior, not anterior, (2) in having a fifth stamen represented by a sterile staminode, (3) in the ovary not linear, shape of the nutlets, which are osseous and deeply furrowed dorsally, rather than smooth and thin-testaceous, (4) in the nutlets not separating spontaneously and being surrounded by a large pointed pithy ring double their length, (5) by the presence of albumen in the seeds, and (6) by the nutlets being 2-locular, not unilocular.

The generic name Castelia Tin., referred to above, is a synonym of Festuca L. in the Poaceae, while Castelia Liebm. and Castela Turp. are synonyms of Neocastela Small (1911) in the Simaroubaceae.

CASTELIA CUNEATO-OVATA Cav., Anal. Cienc. Nat. Madrid. 3: 134—135, pl. 30, and Icon. & Descr. Pl. 6: 60, pl. 583. 1801.

Synonymy: Priva laevis A. L. Juss., Ann. Mus. Hist. Nat. Paris 7: 70. 1806. Verbena tuberosa R. Graham, Edinb. N. Phil. Journ. 29: 174. 1840. Priva ? orchiooides Walp., Repert. 4: 36. 1845. Verbena orchiooides Walp., Repert. 4: 36, in syn. 1845. Verbena lobelioides Hort. ex Schau. in A. DC., Prodr. 11: 533. 1847. Bouchea copiapensis C. Gay, Hist. Fis. Chile Bot. 5: 26 and Atlas 1: pl. 55. 1849. Cartelia cuneato-ovata Cav. apud C. Gay, Hist. Fis. Chile Bot. 5: 7. 1849. Pitreaea chilensis Turcz., Bull. Soc. Imp. Nat. Mosc. 35 (2): 329. 1862. Bouchea copiapina Gay ex R. A. Phil., Anal. Univ. Chil. 35: 193. 1870. Phelloderma cuneato-ovata (Cav.) Miers, Trans. Linn. Soc. Lond. Bot. 27: 100. 1870. Castilleja cuneato ovata Cav. apud F. Philippi, Cat. Pl. Vasc. Chil. 217. 1881. Priva orchiooides Walp. ex Jacks., Ind. Kew. 2: 628, in syn. 1894. Priva cuneato-ovata (Cav.) Rusby, Bull. Torrey Bot. Club 27: 80. 1900. Priva cuneato-ovatis (Cav.) Rusby apud Grenz., Ann. Mo. Bot. Gard. 13: 74. 1926. Bouchea copiapensis Clos.—Phil. ex Moldenke, Prelim. Alph. List Invalid Names 7, in syn. 1940.

Literature: See the list given under the genus as a whole.

Illustrations: Cav., Anal. Cienc. Nat. Madrid 3: pl. 30. 1801; Cav., Icon. & Descr. Pl. 6: pl. 583. 1801; C. Gay, Hist. Fis. Chile Bot. Atlas 1: pl. 55. 1849; Miers, Trans. Linn. Soc. Lond. Bot. 27: pl. 27. 1870; Gartenfl. 32: pl. 1131 (colored). 1883; Sanzin, An. Soc. Cienc. Argent. Buenos Aires 88: 106. 1919; Kozbuski, Ann. Mo. Bot. Gard. 13: pl. 4, fig. 12, & pl. 5, fig. 21.

1926; Junell, Symb. Bot. Upsal. 4: figs. 73, 74, & 77-79. 1934.

Perennial herb, to 6 dm. tall, usually 3-5 dm. tall, erect, glabrous and glaucescent or more or less puberulent, able to withstand great drought, often more or less stoloniferous, with a somewhat flexuous taproot about 7.5 cm. long and a few other long fibrous roots which bear deep in the ground one or more very small globose or elliptic edible tubers; tubers produced at the ends of the fibrous roots, about the size of a hazelnut (Corylus avellana L.) or small potato (Solanum tuberosum L.); stems erect, often rather stiffly so, fistulose, simple or few-branched from the base, more or less fleshy, stiffly pilosulous or very lightly puberulent above, often glabrous and glaucescent toward the base, green when fresh, light-brownish or stramineous in drying, rather obtusely tetragonal or acutely so at the base, often leafy to the base with the leaves about 5 cm. apart; branches few, opposite, arising from the base or up to a height of 22 cm., tetragonal; nodes more or less annulate; principal internodes 1-7.3 cm. long; leaves decussate-opposite, often with several or many small ones fascicled on very much abbreviated branchlets in their axils; petioles slender or stout and fleshy, 0.5-3 cm. long, flattened in drying, very obscurely and minutely puberulous or glabrate, sometimes with the margins lightly ciliate; leaf-blades varying from ovate to deltoid-ovate or oblong-ovate, rather fleshy when fresh, membranous or chartaceous in drying, uniformly pale-green on both surfaces or paler beneath, 1.2-7.5 cm. long, 1-5 cm. wide, abruptly obtuse or acute at the apex, coarsely and irregularly dentate or deeply serrate along the margins with sharp-pointed often widely divergent and mucronate teeth, very abruptly narrowed to an acute or acuminate, often truncate-cuneate, base and narrowed into the petiole, minutely pulverulent-puberulent or even rugulose on both surfaces, becoming subglabrate with only the teeth scabrous-ciliate; midrib and the 5-7 pairs of ascending and rather straight secondaries slender, obscure above, not at all prominent beneath when dry; vein and veinlet reticulation not discernible; inflorescence terminal, spicate, 6-28 cm. long, 1.5-5 cm. wide, many-flowered, very shortly pilosulous, sometimes appearing pseudo-capitate when young, with loose terminal heads to 5 cm. wide, the flowers eventually scattered or disposed in approximate whorls of 2-6 or more; peduncle continuous with the stem or branch and similar in all respects, 2-5.5 cm. long, puberulent; rachis similar to the peduncle in texture and pubescence; bracts and bractlets none, but the prophylla conspicuous, one subtending each flower, elliptic-oblong, sessile, acute or acuminate at the apex, 4-8 mm. long, 2-2.5 mm. wide, puberulent, from half as long as to equaling the calyx in length; flowers sessile or subsessile or on obscure pedicels to 1 mm. long, about 9.5 mm. wide, attractive, very sweet-scented; calyx green with red-purple stripes, tubular, thin-textured (almost translucent), 6.5-10 mm. long, zygomorphic, somewhat curvate, 5-costate and fluted, finely puberulent, 2-lipped, the lower (abaxial) lip longer and 2-lobed, with the lobes about 4.1 mm. long, the upper (axial) lip shorter and 3-lobed, with

the lobes 1.5--2 mm. long, all 5 lobes narrow-ovate and long-acuminate; corolla hypocrateriform, zygomorphic, varying from white, whitish-lilac, purplish-white, pinkish-white or grayish-white to purple, violet, lilac, blue, rose, lilac-rose, lilac-red, pink, very pale-mauve, pale-rose, or parme-violet mauve, sometimes white tinged with light-purple or whitish outside and pink inside, its tube broadly cylindrical, curvate, about 11 mm. long on the upper and $1\frac{1}{4}$ mm. long on the lower side, light-textured, glabrous, about 2 mm. in diameter, slightly ampliate beneath the limb, the limb 2-lipped, 5-lobed, the upper lip 2-lobed, with each lobe obovate-elliptic, about 5.2 mm. long and 4.5 mm. wide, blunt at the apex, the lower lip 3-lobed, the central lobe largest, elliptic, about 10 mm. long and 8 mm. wide, blunt at the apex, the two lateral lobes medium-sized, broadly elliptic, about 8 mm. long and 7 mm. wide, blunt or rounded at the apex; fertile stamens 4, didynamous, included, the upper pair inserted about 1.3 mm. below the lower corolla-limb sinus and 4.1 mm. below the upper sinus, the lower pair inserted about 5.1 mm. below the lower sinus and 7 mm. below the upper sinus, the upper pair being on the lower (larger) lip; filaments filiform, the lower pair about 1.4 mm. long, the upper pair about 2.6 mm. long, all four often more or less genuiflexuous and more or less pilose; anthers oblong or ovate, about 2 mm. long and 1 mm. wide, deeply cordate or sagittate to the middle from the base when ripe through the spreading of the thecae, opening by longitudinal slits; staminode one, anantherous, shorter than and inserted somewhat lower than the lower pair of fertile stamens; pistil included, rarely 3-carpellary; style rather stout, about 7.8 mm. long, glabrous, about equaling the corolla-tube, filiform but gradually dilated and compressed toward the apex; stigma rather large, capitate, uncinately-recurved, mucronate, bilamellately compressed, unlobed, papillose on the inner surface; ovary varying from subcylindric or oblong to oblong-conic, situated on a glandular disk, about 3.1 mm. long and 1.4 mm. wide, glabrous, 2--4-celled, with the dissepiment directed toward the axis of the inflorescence and 2-lamellate, the lamellae distinctly separated; ovules usually 4, erect; fruiting-calyx distended, bottle-shaped, closely investing and including the fruit, about 9 mm. long and 4 mm. wide, minutely puberulent, contracted and pressed together above the fruit, the rim 5-caudate, the teeth contorted-plicate; fruit rarely produced, green and light-yellow, drupaceous, included by the mature fruiting-calyx, ovate or ovate-acute, about the size of a grain of pepper (*Piper nigrum* L.), apiculate, smooth, scarcely striate, indehiscent, 2-celled, the cells covered by a dorsal thick and somewhat corky mesocarp, surrounded along the margins, at the cuneate-acuminate apex, and at the hollow base by a thick pith, at maturity forming two pyrenes or nutlets, immersed in and about half as long as the cells, ovate, convex on the back and flat on the sides, deeply 9-sulcate on the outside, with the channels filled by mesocarp, 2-sulcate within, osseous, each 2-locular, the locelli perforated at the base by the nutritive vessels, the columella central, thin-membranous, empty,

adnate, forming a vacant space between the nutlets; seeds solitary in each locellus, oblong, subterete, erect, attached at the extero-basal angle by a short funiculus; integument very thin; raphe lateral, ascending to the apical chalaza; embryo included in a sparse albumen, linear-cylindric; cotyledons 2, twice as long as the inferior radicle.

The species is based on a collection made by Louis Néé in the year 1794 on the pampas of Argentina. According to collectors, it inhabits the sandy soil of deserts, red soil, sandy loam, dry open sunny cultivated fields, irrigation ditches and moist places when available, pampas, roadsides, in semi-shade when available, wet matorrales, dry streambeds, pastures, the edges of canyons, margins of lakes, the base of hills, cultivated ground and rocky places in general. It is said to be a weed in gardens, in cities, and in cultivated ground in general, usually in rather dry although somewhat shaded situations; in moist ground it becomes leafy. Schulz found it abundant in brambly ground along railroad tracks in Tucumán; Jørgensen found it abundant in potreros in Catamarca and common in meadows in the Chaco. Venturi found it growing among rocks in quebrados. Werdermann reports it to be "a widespread weed" in Chile, but Hosseus and Lossen found it only "here and there" in Argentina. It ascends from near sealevel to 3420 meters altitude in Argentina. It has been collected in anthesis in every month of the year except July.

Of all the material examined by me, only one sheet has been in fruit; this was collected by Gillies and is deposited in the Kew herbarium. It has only 6 or 8 fruits scattered here and there in the spikes. It would seem, therefore, that fruit is seldom produced by this species. The flowers are strongly odorous and fragrant. There is a decided taproot, with only very few small sideroots. The morphology of the species is discussed by Dahlgren in *Svensk. Bot. Tidsk.* 32: 231 (1938) and the gynoeceum morphology by Junell in *Symb. Bot. Upsal.* 4: 39-43 & 77-79 (1934). When the leaves are large, as on the Hort. Erf. specimen from Peru in the Berlin herbarium, they remind one of the leaves of *Chenopodium album* L. or of *Spinacia oleracea* L. Good examples of the tubers can be seen on Rusby 2531 in the Columbia University herbarium, Schickendantz 72 at Berlin, Lorentz 62 and 140 at Berlin, Hort. Berol. s.n. [März '76] at Berlin, Philippi s.n. at Berlin and Vienna, Stuckert 5498 at Geneva, and Venturi 590 and 790 at Washington. The Meyen specimen at Berlin shows the whorled character of the flowers very well, as do also the Hort. Erf. specimen from Peru at Berlin, Herb. Bernhardi s.n. at Berlin, Stuckert 18639 at Geneva, Werdermann 137 at the Gray Herbarium, and Venturi 4865 at the Gray Herbarium. Many scores of sheets show the flowers in approximate whorls, the uppermost often too crowded to show it clearly.

Common names recorded for the species are "bapilla", "cuchipapa", "papa de zorra", "papilla" [=small potato], and "vara de San José". Metcalf calls the plant and "annual herb", but this is certainly an error in observation. The species resem-

bles in some respects Priva grandiflora (Ort.) Moldenke from similar habitats in Mexico, which also produces small underground tubers. It has been confused by herbarium workers with Bouchea pseudogervao (St. Hil.) Cham.

I am assuming that the specimens collected in the state of Rio de Janeiro, Brazil, were from introduced and naturalized material, perhaps growing as a weed in the city of Rio de Janeiro itself. Maldonado B.177 has labels which state that the plant occurs on streets and in cultivation in Santiago del Estero, Argentina.

Pitreaa chilensis is often erroneously cited to volume 36, part 2, page 328, of Bull. Soc. Imp. Nat. Mosc., but was actually published in volume 35, part 2, page 329. It is based on Bridges 1354 from Coquimbo, Chile. The name Priva orchioides is based on the Hort. Berol. s.n. collection, gathered from cultivated material in the Botanischer Garten at Berlin in August, 1843, and deposited in the Berlin herbarium. The original date of its publication is usually given as 1844 or 1845, but according to a writer in Flora on April 7, 1846, page 207, the first twelve sheets of this volume of Walpers' Repertorium, including the page with the original description of this plant, were just then published.

In all, 315 herbarium specimens and 33 mounted photographs have been examined.

Citations: PERU: Ica: Scolnik 1032 (N). Tacna: Raimondi 1813 (B). BRAZIL: Rio de Janeiro: Barboza s.n. [Rio de Janeiro] (Br, Br, Br); Schüch s.n. [Rio de Janeiro] (Mu--242). BOLIVIA: Potosí: Cardenas 3712 (S); Fiebrig 2950 (B). Province undetermined: Bridges s.n. [Bolivia] (V). CHILE: Antofagasta: Pfister 9360 (S). Atacama: Gigoux s.n. [Nov. 1885] (G); I. M. Johnston 5847 (G, N--photo, Z--photo); Meyen s.n. [Copiapo] (B, B, B, K, N--photo, Z--photo); R. A. Philippi 787 (B, N--photo, W--photo, Z--photo), s.n. [Atacama] (V); Werdermann 137 (B, Bm, Ca--238262, Cb, D--549261, E--910057, Ed, G, Gg--34511, K, N--photo, Ut, Z--photo). Coquimbo: Bridges 1354 (Bm, Cb, K, N--photo, Z--photo), 1355 (G), s.n. [prov. Coquimbo] (Br); Cuming 1354 (V); R. A. Philippi 933 (L, X), s.n. [Cuncumen] (B, V, V). Santiago: J. Ball s.n. [Santiago] (K); Claude-Joseph 735 (W--1058708), 804 (W--1058766); Collector undesignated s.n. (Vu); Pahlman s.n. [Los Nogales, 23.1.1913] (S); Tweedie 1105 (K). Tacna: Berninger 309 (B); Buchtien 4381 (W--1175992); Eyerdam 24646 (Ca--657173); Jaffuel 1634 (G); R. D. Metcalf 30350 (W--1834983); H. H. Rusby 2531 (C, F--164663, Pa); Mrs. R. S. Shepard 269 (G, Gg--31231, N, N--photo, P, W--1197324, Z--photo); Skottsberg & Skottsberg 1489 (Go, N, S); Woitschach 87 (B). Tarapaca: D'Urville s.n. (V). Valparaiso: Bridges 453 (K). State undetermined: Claude-Joseph s.n. [Mittleres Chile] (B); Collector undesignated s.n. [Chili] (B, N--photo, Z--photo); C. Gay s.n. (P, P); Reed s.n. (K). ARGENTINA: Buenos Aires: Hauthal 6 (B); Née s.n. [Buenos Ayres]

(F--844436). Catamarca: Brizuela 540 (N), 542 (N), 992 (N, S); Cabrera 1064 (N); Castillón 1942 [Herb. Inst. Miguel Lillo 14243] (N), s.n. [Herb. Inst. Miguel Lillo 14242] (N); Collector undesignated 10 (D); Jørgensen 1022 [Herb. Osten 11426] (Ca--202595, E--809178, G, Ug, W--704749), s.n. [Herb. Mus. Argent. Cienc. Nat. 23989] (N); Schickendantz 72 (B, Cb, Cb); Schreiter s.n. [XI. 1915] (N); Venturi 6079 (W--1591484), 7101 (Gg--160658); Villafane 1166 (N), 1222 (N), 1228 (N), 1244 (N), 1276 (N). Chaco: Jørgensen 2480 [Herb. Osten 13677; Herb. Mus. Argent. Cienc. Nat. 23977] (E--831938, G, N, N, Ug, W--1055186). Córdoba: A. Burkart 10406 (N, N); Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 11673] (N), s.n. [Herb. Mus. Argent. Cienc. Nat. 31204] (N); Fielding s.n. (Em); Galander s.n. [18.II.1881] (B, B, N, N--photo, W--photo, Z--photo); Goodspeed 23241 (Ca--657351); J. Gutiérrez 116 (N); Herb. Baillon s.n. (P); Hieronymus 162 (B, K), 490 (P), s.n. [XI.1874] (B), s.n. [X.1877] (Bm, K), s.n. [X.1879] (Br); Kuntze s.n. [XI.92] (F--297338, N), s.n. [XII.1891] (N); Lorentz 62 (B, B, Bm, Br, Cb, L, Mu--1590, V, X), 140 (B, Ed), 146 (B), 561 (B, N--photo, Z--photo); Lossen 3 (Ba, D--671540, E--919632, F--584611, G, L, Mu--4364); Miers s.n. [Tres Cruces] (Em); Pierotti 5117 (N); Rodrigo 389 (N, N); Scolnik 1756 (S); Stuckert 125 (Cb), 561 (Cb), 776 (Cb), 932 (Cb), 1642 (Cb), 2515 (Cb), 3550 (Cb), 3631 (Cb), 5179 (Cb), 5498 (Cb), 5679 (Cb), 5938 (Cb), 7092 (Cb), 7296 (Cb), 8431 (Cb), 8517 (Cb), 9201 (Cb), 11293a (Cb), 17304 (Cb), 21569 (Cb); Troncoso 317 (N); Tweedie s.n. (K); Villafane 92 (N); Wall & Sparre s.n. [17/12/46] (Ew, Ew, Ew, Ew). Jujuy: Balls 5932 (W--1777767); Claren 11738 (S); Lillo s.n. [Herb. Inst. Miguel Lillo 9651] (N); M. Meyer s.n. [Herb. Inst. Miguel Lillo 34399] (N); Venturi 4865 [Herb. Osten 20788] (F--637873, G, N, Ug, W--1591446), 8594 (E--962143, G, W--1591410). La Rioja: Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 33900] (N); Esteban 28 [Herb. Lab. Bot. Buenos Aires 10676; Herb. Osten 19357] (Ug); Hieronymus & Niederlein 522 (B); Hosseus 1487 (B); Schmaedke s.n. [Stuckert 18639] (Cb); Stuckert 18964 (Cb); Venturi 7848 (G, N--photo, Ug, W--1442917, W--1591394, Z--photo). Mendoza: Collector undesignated s.n. (V); G. Dawson 954 (N); Gillies s.n. (Ed, K, N--photo, Z--photo); Jensen-Harup s.n. [Santa Rosa, 1905] (Cp, Le, N--photo, Us, Z--photo); Jørgensen 97 (Cp); D. O. King 142 (Bm); Lourteig 937 [Herb. Inst. Miguel Lillo 114104] (S); Miers s.n. [Mendoza] (Bm), s.n. [Travesia de Mendoza] (Bm, N); Paci 646 (N, Ug); R. A. Philippi s.n. [Mendoza] (B, B); Ruiz s.n. [Herb. Mus. Argent. Cienc. Nat. 25/2183] (N), s.n. [Herb. Mus. Argent. Cienc. Nat. 25/2215] (N); Ruiz Leal 8905 (N), 9024 (N), 10762 (Z); Sandeman 4712 (K); Semper s.n. [29.II--6.

III.1944] (N, Si); Villafane 899 (N), 933 (N), 974 (N), 990 (N), 1025 (N), 1073 (N, S). Salta: Hunziker 1312 (N, N); Lillo s.n. [Herb. Inst. Miguel Lillo 8082] (N), s.n. [Herb. Inst. Miguel Lillo 32457] (N, N); T. Meyer 3883 [Herb. Inst. Miguel Lillo 35686] (En, N), 4771 (Ca--905960, N, N); D. Rodriguez 1253 [Herb. Inst. Miguel Lillo 16667] (F--809356, N), s.n. [Herb. Mus. Argent. Cienc. Nat. 23978] (N). San Juan: Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 26/598] (N); Cuezzo 1033 (N), 1417 (N, S), 1585 (N), 1839 (N), 1876 (N), 1980 (N); Jameson s.n. [San Juan & Jachal, 9/71] (K, K, N--photo, Z--photo). San Luis: Castellanos s.n. [Herb. Mus. Argent. Cienc. Nat. 25/931] (N), s.n. [Herb. Mus. Argent. Cienc. Nat. 25/2923] (N), s.n. [Herb. Mus. Argent. Cienc. Nat. 26/2269] (N), s.n. [Herb. Mus. Argent. Cienc. Nat. 26/2277] (N); Terribile 752 (N). Santa Fé: Ragonese s.n. [Herb. Mus. Argent. Cienc. Nat. 19771] (N). Santiago del Estero: Balegno 231 (N, S); Cuezzo 2337 (N); Herb. Inst. Miguel Lillo 9 (S); Lillo s.n. [Herb. Inst. Miguel Lillo 6133] (N); Luna Rizzo 58 (N); Maldonado B.177 (Ca--882449, N), 326 (N); Monetti 428 (N); Venturi 5759 (N, W--1591480). Tucumán: Balletti 308 (N); Dinelli s.n. [Herb. Inst. Miguel Lillo 11870] (N); Herrera 284 (S); Lillo s.n. [Herb. Inst. Miguel Lillo 323] (N); Monetti 811 [Herb. Inst. Miguel Lillo 15280] (N), s.n. [Herb. Inst. Miguel Lillo 32466] (N); Peirano s.n. [Herb. Inst. Miguel Lillo 78631] (N); Schreiter s.n. [Herb. Osten 12189; Herb. Inst. Miguel Lillo 32600; Herb. Mus. Hist. Nat. Montev. 4929] (N, Ug, Ug); A. G. Schulz 2890 (N); Stuckert 9089 (Cb); Venturi 590 (N, W--1591225), 790 (N, W--1591228), 2179 (N). Province undetermined: Collector undesignated s.n. (B); Hosseus 1021 (B); Jameson s.n. [Herb. Hance 19693] (Bm, Us), s.n. [9/72] (K), s.n. [1871--72] (B, V). CULTIVATED: Argentina: Maldonado B.177 (N). Belgium: Hort. Thensis II.804 (Br). England: Herb. W. Hooker s.n. [Hort. Kew] (K); Herb. Soc. Hort. London s.n. [1840] (K); Reid s.n. [Yalding, Kent, 21/8/15] (K). Germany: Herb. K. Koch s.n. (B); Herb. Kummer s.n. (Mu--1237); Hort. Berol. s.n. [Aug. 1841] (B), s.n. [Aug. 1843] (B, N--photo, Z--photo), s.n. [Maerz '76] (B), s.n. [27.9.1879] (B), s.n. (B); Hort. Erf. s.n. ["Peru"] (B, B, N--photo, Z--photo). Sweden: Hort. Mus. Bot. Stockholm s.n. [1855] (S). LOCALITY OF COLLECTION UNDETERMINED: Collector undesignated s.n. ["F"] (G); E. W. White 56 (Bm).
